CLAIMS

1. An environmental control system for an aircraft comprising;

a vapor cycle system including a compressor wherein a refrigerant is compressed, a condenser wherein the refrigerant is liquefied, a throttle valve wherein the compressed and cooled refrigerant is expanded further reducing the temperature thereof, a primary evaporator wherein the expanded refrigerant is used to provide cooling to a cooling medium, and a secondary evaporator for receiving refrigerant from said primary evaporator;

an air cycle system having compressor means for providing compressed air, means to cool the compressed air, means to expand the cooled and compressed air, means to expand the compressed and cooled air further reducing its temperature, a heat exchanger for receiving the air to provide cooling for a second cooling medium;

an air to fuel heat exchanger located between said compressor means and said secondary evaporator of said vapor cycle system for receiving fuel after the fuel has passed through said condenser of said vapor cycle system and cooling the compressed air from said compressor means; and

means to pass the pressurized air from said fuel to air heat exchanger to said secondary evaporator.

2. The environmental control system as set forth in claim 1 wherein the fuel passes through the said condenser to cool the refrigerant prior to reaching said fuel to air heat exchanger.

3. The environmental control system as set forth in claim 2 wherein the fuel is directed to an engine of the aircraft after exiting said fuel to air heat exchanger.

4. The environmental control system as set forth in claim 3 further comprising a turbine for expanding the air prior to the air providing cooling for said second medium.

6. An improvement to an environmental control system for an aircraft including a vapor cycle system having a primary evaporator and an air cycle system including a compressor coupled to at least one air to air heat exchanger, the improvement comprising;

a secondary evaporator coupled in series to said primary evaporator;

an air to fuel heat exchanger wherein the air is cooled by fuel; and

means to couple said compressor to said air fuel heat exchanger and to said secondary evaporator prior the compressor and at least one air to air heat exchanger.

7. The environmental control system as set forth in claim 6 wherein the fuel passes through the said condenser to cool the refrigerant prior to reaching said fuel to air heat exchanger.

8. The environmental control system as set forth in claim 7 wherein the fuel is directed to an engine of the aircraft after exiting said fuel to air heat exchanger.

9. The environmental control system as set forth in claim 3 further comprising a turbine for expanding the air prior to the air providing cooling for said second medium.